MASSACHUSETTS SMOKE ALARM LAWS ARE CHANGING AS OF JANUARY 2010

Whenever a home is sold in Massachusetts it is required that the home is inspected by the local fire department for properly working smoke alarms and carbon monoxide smoke alarms. This law has been in place for decades and is designed to save lives. A property can not change hands without a certificate issued by the fire department. More information on this process in Boston can be obtained at the following link.

http://www.cityofboston.gov/fire/sdi_form.asp.

Effective January 1, 2010, a new regulation relating to the installation and maintenance of certain smoke alarms will be put in place. This article will describe the new regulations and the reason for them.

NEW FIRE ALARM REGULATIONS

In January of 2009, the Board of Fire Prevention Regulation passed a new regulation **(527 CMR 32.00)**. Here is a link to the new regulation restricting the use of ionization smoke alarms.

http://www.mass.gov/eopss/docs/dfs/osfm/cmr/cmr-secured/527032.pdf

According to the new regulation, owners of certain residential buildings, who need an inspection by the local fire department, typically at the time that a property is sold, will not be allowed to use ionization smoke alarms as stand alone alarms. While the new regulation does not change the locations where smoke alarms are required, it does restrict the type of technology that can be used in certain locations. Within 20 feet of a kitchen or bathroom only a photoelectric smoke alarm is allowed. Beyond 20 feet either a dual alarm, containing both photoelectric and ionization technologies or 2 separate ionization and photoelectric alarms must be installed.

All property owners should determine what type of smoke alarms they are currently have installed. In order to comply with the law you can either install two separate alarms that have both technologies or by installing one that utilizes both.

The inspection for both the smoke and carbon alarms is done by the inspector prior to closing. Here is a link to the Massachusetts Carbon Monoxide and Smoke Alarm regulations.

http://www.mass.gov/eopss/docs/dfs/osfm/cmr/cmr-secured/527031.pdf
http://www.mass.gov/eopss/docs/dfs/osfm/cmr/cmr-secured/527024.pdf

The Boston Fire Department was a driving force behind these changes. The Boston Fire Department wants to remind everyone that the most important action one can take is to make sure that whatever type of smoke alarm that is installed is working properly.

However, the position of Boston Fire Department however, is that **photoelectric alarms are generally more effective than ionization alarms across the broader range of fire experienced in homes, and should be promoted as the technology of choice.** It is the type of smoke alarm that the Boston Fire Dept. has utilized, for years, in our smoke alarm give-away program that is coordinated with the City's Office of Elder Affairs. Here are the reasons for this opinion.

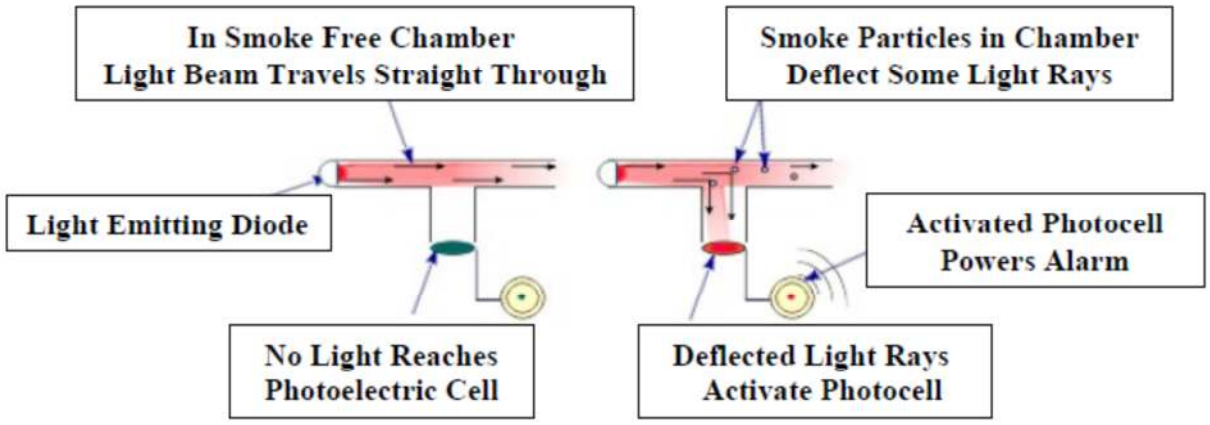
- Ionization smoke alarms detect flaming fires marginally earlier than photoelectric smoke alarms.
- Photoelectric smoke alarms detect smoldering fires and fires starting in areas remote from smoke alarms significantly earlier than ionization smoke alarms.
- Ionization smoke alarms may not operate in time to alert occupants early enough to escape from smoldering fires.
- For both flaming fires and smoldering fires, photoelectric smoke alarms are likely to alert occupants in time to escape safely.
- Ionization smoke alarms are far more prone to disablement due to excessive nuisance alarms than photoelectric smoke alarms.

INFORMATION ON THE DIFFERENT TYPES OF SMOKE ALARM TECHNOLOGY

Photoelectric Smoke Alarm Technology

Photoelectric technology smoke alarms use a T-shaped chamber fitted with a light emitting diode (LED) and a photocell. The LED sends a beam of light across the horizontal bar of the chamber. The photocell sits at the bottom of the vertical portion of the chamber. The photocell will generate a current, when exposed to light.

The diagram below illustrates how the technology works. Under normal, smoke-free conditions, the LED beam moves in a straight line, through the chamber without striking the photocell. When smoke enters the chamber, smoke particles deflect some of the light rays, scattering them in all directions. Some of it reaches the photocell. When enough light rays hit the photocell, they activate it. The activated photocell generates a current.The current powers the alarm, and the smoke alarm has done its job.

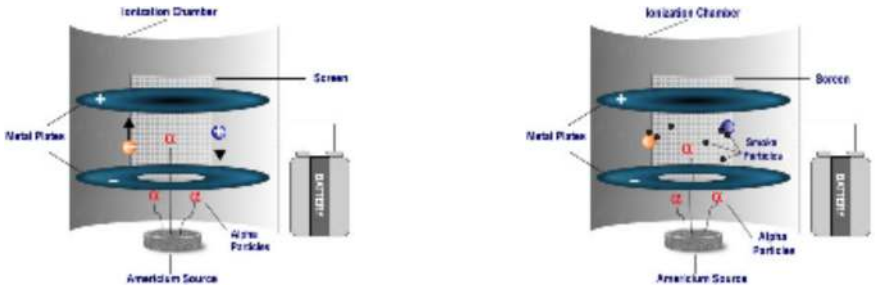


Ionization Smoke Alarm Technology

The ionization chamber is basically two metal plates a small distance apart. One of the plates carries a positive charge, the other a negative charge. Between the two plates, air molecules-made up mostly of oxygen and nitrogen atoms-are ionized when electrons are kicked out of the molecules by alpha particles from the radioactive material (alpha particles are big and heavy compared to electrons). The result is oxygen and nitrogen atoms that are positively charged because they are short one electron; the free electrons are negatively charged.

The diagrams below illustrate how ionization technology works. The positive atoms flow toward the negative plate, as the negative electrons flow toward the positive plate. The movement of the electrons registers as a small but steady flow of current. When smoke enters the ionization chamber, the current is disrupted as the smoke particles attach to the charged ions and restore them to a neutral electrical state. This reduces the flow of electricity between the two plates in the ionization chamber. When the electric current drops below a certain threshold, the alarm is triggered.

Alpha particles from the americium source ionize air molecules. In the smoke-free chamber, positive and negative ions create a small current as they migrate to charged plates



Smoke particles and combustion gases interact with the ions generated by the alpha particles, restoring them to their neutral electronic state and decreasing the electrical current passing through the cell.

As fewer ions are available to migrate to the plates, the disrupted current triggers the Alarm

Consequences of Different Alarm Technologies

The difference in operational technology between the two alarms is the reason for the ionization alarms higher sensitivity to fast-flaming fires, which produce small particle smoke. It is this same technological difference that causes ionization alarms to be most sensitive to "invisible smoke," i.e. nuisance alarms," while at the same time photoelectric alarms are virtually insensitive to invisible smoke. The operational differences also explain why the photoelectric alarm is far more sensitive to smoldering smoke, which generally contain larger and fewer particles than smoke from flaming fires.